

1160 W. Orange Grove Ave., Arcadia, California, U.S.A.
© Copyright 1971

CONCERNING *COLIAS CHRISTINA MAYI*

CHERMOCK & CHERMOCK

JOHN H. MASTERS¹

Lemon Street North, North Hudson, Wisconsin 54016

THE NAME *Colias christina mayi*, as proposed by Chermock & Chermock (1940) to a butterfly from Riding Mountain, Manitoba, has created quite a bit of confusion over its correct application. Most Manitoba lepidopterists apply the name "*mayi*" to their local populations of *Colias christina* Edwards, but elsewhere it is frequently treated as a subspecies of *Colias gigantea* Strecker or *Colias scudderii* Reakirt. Dos Passos (1964) treats it as a synonym of *Colias gigantea harroweri* Klots.

The rather brief and inadequate original description, which I quote below in its entirety, is of little use in solving the problem:

Colias christina mayi new race"

"This subspecies in color and marking is very similar to *gigantea* (Stkr.) on the upper surface in both sexes; however, it may be readily separated from its nearest relative *gigantea* by the absence of the heavy overcast of black scales on the secondaries and the costal area of the primaries. There is in *mayi* a very sparse sprinkling of black scales on the area just mentioned. The pink fringes are less intense in *mayi* than in *gigantea*. The marginal band of the female varies from a fairly well defined band on the primaries to the total absence of a band." Holotype—male, July 1, 1933, Riding Mountains, Manitoba. Allotype—female, July 1, 1936, same locality. Paratypes—1 to 150, same locality. This race is very abundant in the Riding Mountains."

Six species of *Colias*, *christina*, *gigantea*, *interior* Scudder, *palaeno* (Linnaeus), *eurytheme* Boisduval, and *philodice* Godart, occur on Riding Mountain and the original description of *mayi* could be construed to fit any of the first four of these. The agreement fits best with *gigantea*, however, and I have ascertained by examination of the holotype female (fig. 1A) and a series of paratypes of both sexes in the Carnegie Museum collection, that the type series of *mayi* represents a population of *Colias gigantea* and not *Colias christina*.

¹Research Associate, Carnegie Museum, Pittsburgh, Pennsylvania.

At the time of their original description, the Chermock's must have considered *mayi* and *gigantea* both as subspecific populations of *Colias christina*; there is no other logical reason why they would describe their butterfly under *christina* while comparing it to *gigantea*. An interesting note was found attached to a specimen of Riding Mountain *gigantea* in the Barnes collection (now in the U.S. National Museum, Washington), it reads: "Vi-28-1933. I think this *Eurymus* is new. What do you think? F. H. Chermock." Note: *Eurymus* Horsfield is a junior objective synonym of *Colias* Fabricius; it would be the valid name if the I.C.Z.N. had not used its plenary powers to preserve *Colias* by designating *Papilio hyale* Linnaeus as the type species of *Colias*.

A secondary problem in the treatment of *mayi* is a result of it having been preceded in publication, by a few months, by the description of *Colias gigantea harroweri* Klots (1940). *Harroweri* was described from Sublette County, Wyoming and only Wyoming specimens were included in the type series, but Klots stated: "The name *harroweri* should be certainly applied to Wyoming, Idaho and Montana specimens of *gigantea*; and it should probably also be used for those from the southern regions of Manitoba, Alberta and British Columbia." This is undoubtedly dos Passos authority for sinking *mayi* as a synonym of *harroweri*. However, Klots went on to say: "The southern Canadian specimens are not typical, however, showing in some respects intergradations to *g. gigantea*, and in other respects intergrading to *christina*, *emilia*, *alexandra* and *occidentalis* in a very puzzling way." Klots has later said (personal communication, 21 October 1967): "Of course *mayi* Ch. & Ch. has nothing to do with *harroweri*."

To determine if *mayi* is sufficiently distinct from nominate *gigantea* and *harroweri* to stand as a subspecies in its own right, I assembled and compared long series of "*mayi*" from Riding Mountain and "*gigantea*" from Churchill, Manitoba (type locality) with a short series of *harroweri* from the Wind River Range, Wyoming and Polaris, Montana. The Riding Mountain series appears to be, in phenotype expression, much closer to the Rocky Mountain series, but there are a couple of obvious distinctions. Outwardly, it is most distinct from the Churchill series, but the species occurs continuously from Churchill southwestward to The Pas, Manitoba and then southward, along the Manitoba Escarpment, to Riding Mountain, and an examination of short series from intermediate points (e.g. Duck Mountain, The

Pas and Gillam) shows gradual intergradation of characters, indicating that the two populations represent ends of a cline. There has been considerable discussion in recent years as to whether clinal populations should be designated as subspecies, and a persuasive argument can be made for either side of the question. In cases like this where the subspecific names apply at the ends of the cline and where the phenotypical expression at the opposite ends is markedly different, my personal prejudice is to let them stand. Thus I regard *mayi* as a valid subspecies of *Colias gigantea*, representing the Manitoba Escarpment population.

The distinctions between the three subspecies of *Colias gigantea*, as observed in my examination, are summarized below:

(1) Size. *Mayi* is very large compared to the others and *harroweri* averages slightly smaller than *gigantea*. I measured the average fore-wing lengths as:

	males	females
<i>C. g. gigantea</i> (Churchill)	26 mm.	27 mm.
<i>C. g. harroweri</i> (Wyoming & Montana)	25 mm.	26 mm.
<i>C. g. mayi</i> (Riding Mountain)	29 mm.	30 mm.

(2) The fuscous dusting on the underside of the hind-wings of both sexes is very dark in *gigantea* and much sparser in both *mayi* and *harroweri*. This is the outstanding phenotypic difference and will prevent *mayi* or *harroweri* from keying out to *gigantea* with Klots' key (1961, couplet 4a-4b).

(3) The black borders on the upper sides of the wings of the males are wider in *harroweri* than either of the others and are slightly wider in *mayi* than in *gigantea*.

(4) Yellow females of *harroweri* are a brighter, warmer yellow than those of *mayi*, while those of *gigantea* are quite pale.

(5) The pink wing fringes are of a more intense color in *gigantea* than in the other two. This is especially noticeable in females.

(6) The ratio of white to yellow females is quite different; almost 100% white in *gigantea*, approximately 50-50 in *mayi* and nearly all yellow in *harroweri*. Hovanitz (1950a) recorded 90.91% white at Churchill, 40% in southern Manitoba (Riding Mountain) and 60% in northwest Wyoming. Hovanitz only examined five females from Yellowstone and I believe his statistical error is quite high, from what I have seen the percentage of white females in the Wyoming population appears to be less than 20%.

(7) The black borders of the fore-wings of females may offer statistical differences. Clifford Ferris (personal communication)

states that he can separate *harroweri* females from *mayi* females by this character; but I don't know how since in my series of *mayi* there is every conceivable combination represented from immaculate wings to borders as complete as in *Colias eurytheme* females. The females of *gigantea* have, on the average, more reduced borders than the others and about 50% of them are immaculate. The females of *mayi* are about 25% immaculate and possibly average a greater reduction of black in the borders than does *harroweri*. My sample of *harroweri* includes only four females and is inadequate for drawing any conclusions in this area.

(8) Klots (1940) states that the color of the apex of the underside of the fore-wing and the entire underside of the hind-wing of the males shows differences between *harroweri* and *gigantea* and that in *harroweri* these areas are of a greenish yellow which does not contrast strongly with the ground-color of the rest of the fore-wing, while in *gigantea* the areas are richer and somewhat orange-yellow which contrasts with the paler hues on the rest of the wing. However, I find the greener cast in *gigantea* and the warmer orange-yellow coloration in *harroweri*.

The description of *Colias christina mayi* was accompanied by a description of *Colias christina mayi* form *marjorie* Chermock & Chermock. This being nothing but the white female of the Riding Mountain population (figure 2). *Marjorie* is an infraspecific name with no standing under The Code (International Code of Zoological Nomenclature). If it is necessary to designate the white females, in an infraspecific sense, "marjorie" is available; however, I feel that it is preferable to use the name "alba" as a *nomen collectivum* for the white females of all dimorphic *Colias* species.

In this paper I have treated *Colias gigantea* as a specifically distinct species from *Colias scudderii*; I have done so for simplicity and convenience in my treatment and not to go on record in the debate over this issue. Hovanitz (1950) consolidated them under *gigantea* and dos Passos (1964) under *scudderii*. Klots (1940, 1951, 1961) and others have steadfastly maintained that they are separate species. *Colias gigantea* (including *mayi* and *harroweri*) is a willow feeder and apparently a bog obligate. It occurs in the true arctic and southward in bogs to Wyoming, Southern Manitoba and Minnesota (Masters, 1970). *Colias scudderii* (including *harroweri*) is also a willow feeder, but not restricted to bogs and possibly not even occurring in bogs. It is found in mountain meadows in Colorado and New Mexico.

Dos Passos (1964) should be revised as follows in regards to *Colias scudderii*:

- 292 *Colias gigantea* Strecker, 1900
 - a. *g. gigantea* Strecker, 1900
 - b. *g. mayi* Chermock & Chermock, 1940
 - c. *g. harroweri* Klots, 1940
- 292 $\frac{1}{2}$ *Colias scudderii* Reakirt, 1865
 - a. *s. scudderii* Reakirt, 1865
 - b. *s. ruckesi* Klots, 1937

Or, as an alternative arrangement, if you prefer:

- 292 *Colias scudderii* Reakirt, 1865
 - a. *s. gigantea* Strecker, 1900
 - b. *s. mayi* Chermock & Chermock, 1940
 - c. *s. harroweri* Klots, 1940
 - d. *s. scudderii* Reakirt, 1865
 - e. *s. ruckesi* Klots, 1937

You will notice that I have arranged the subspecies in geographical order; north to south and west to east. This seems to me the preferable treatment for subspecies, which are, in fact, geographical populations. Arrangements by alphabetical or chronological orders are completely artificial and since subspecies are assumed to have evolved by divergence there is no justification for the taxonomist to attempt to devise a phylogenetic order for them.

I have omitted *Colias astraea* Edwards which dos Passos placed under *C. scudderii* in his checklist. It is my opinion that *astraea* is a representative of the *Colias alexandra/christina* complex. F. M. Brown of Colorado Springs is currently studying the types of butterflies described by W. H. Edwards; I will leave to him the prerogative of establishing the true identity of *astraea*.

ACKNOWLEDGEMENTS

I wish to thank Dr. Frederick A. Rindge of the American Museum of Natural History, New York, Dr. William D. Field of the U.S. National Museum, Washington, Mr. Harry K. Clench of Carnegie Museum, Pittsburgh, and Mr. Herb Copland of the Manitoba Museum of Man and Nature, Winnipeg for allowing me access to the collections of their respective institutions, without which this study would have been impossible. I also wish to thank Dr. Alexander B. Klots, of the American Museum, for his extremely helpful correspondence over the past four years, which has been a considerable aid in formulating this paper.

LITERATURE CITED

- CHERMOCK, F. H. & R. L. CHERMOCK, 1940. Some new diurnal Lepidoptera from the Riding Mountains and the Sand Ridge, Manitoba. *Canadian Ent.*, 72: 81-83.
- DOSPASSOS, C. F., 1964. A synonymic list of the Nearctic Rhopalocera. *Memoir No. 1, The Lepid. Soc.*, 145 pp.
- HOVANITZ, W., 1950. The biology of *Colias* butterflies. I. The distribution of the North American species. *Wasmann Jour. Biol.*, 8: 49-75.
- 1950a. The biology of *Colias* butterflies. II. Parallel geographical variation of dimorphic color phases in North American species. *Wasman Jour. Biol.*, 8: 197-219.
- KLOTS, A. B., 1940. New butterfly subspecies from Wyoming (Nymphalidae, Pieridae). *American Museum Novit.*, 1054: 1-6.
1951. A field guide to the butterflies. Houghton-Mifflin Company, Boston, 349 pp.
1961. Genus *Colias*. in Ehrlich, P. R. & A. H. Ehrlich. How to know the butterflies. Wm. C. Brown Co., Dubuque, Iowa, 262 pp.
- MASTERS, J. H., 1970. Records of *Colias gigantea* Strecker (Pieridae) from southeast Manitoba and ? Minnesota. *Jour. Res. Lepid.*, 8: 129-132.

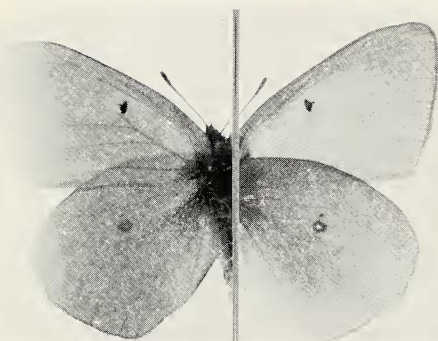
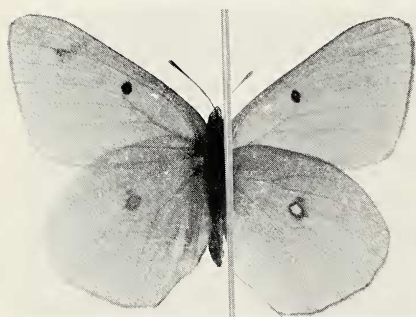


Fig. 1. Allotype female *Colias christina mayi* Chermock & Chermock, Riding Mountain, Manitoba, VII-1-1936. Natural scale. Upper side left, under side right.

Fig. 2. Paratype female *Colias christina mayi* form *marjorie* Chermock & Chermock, Riding Mountain, Manitoba, VI-29-1933. Natural scale. Upper side left, under side right.